Office of
ELECTRIC TRANSMISSION & DISTRIBUTION
ELECTRIC DISTRIBUTION TRANSFORMATION PROGRAM

RealEnergy Inc.

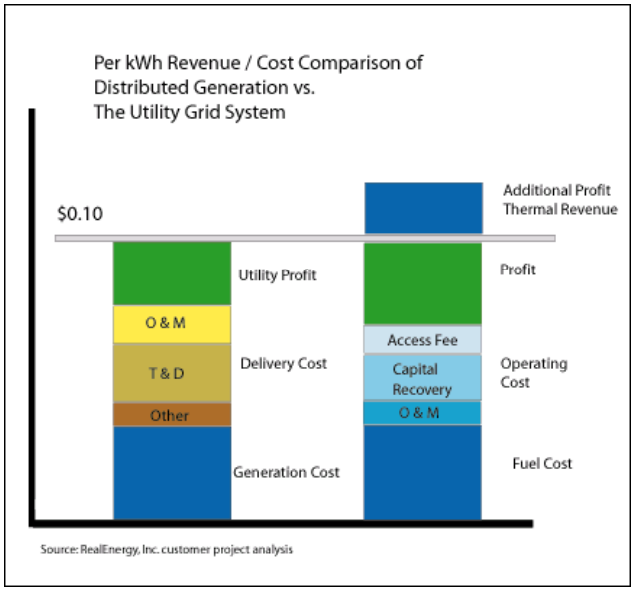
Enterprise-Wide Distributed Energy Information System

Goals

Effective tools for management and control are required to use distributed generation (DG) across an enterprise for reliable and economic power generation. The goals of this project are to develop, demonstrate, and field-test an enterprise-wide DG energy management system that enables a business to monitor and control DG for optimal performance and operation. The work examines design and operational issues, communications standards, and experience with regulatory and market barriers while implementing a business solution.

Background

RealEnergy (RE) has more than 44 MW of DG and combined heat and power (CHP)/DG installed or in construction at dozens of commercial properties in multiple utility territories. The DG systems provide approximately two-thirds of building loads and operate during peak demand and other periods. RE uses best-in-class technologies custom designed to optimize the specific application for each client's business or facility.



RealEnergy's business model

Most of the distributed generators are internal combustion (IC) systems that use natural gas to meet strict air quality standards. IC systems are fuel-efficient and scalable. A few solar electric (PV) systems have been installed.

In commercial buildings, one or more distributed generators are generally set up to operate in parallel with the utility grid. Challenges to achieving optimal performance and operation include:

- Entitlements (air, building, and interconnection)
- Utility barriers to entry (standby, departing load)
- Technology/manufacturer
- Building integration
- Profit/savings
- Scaling (systems, multiple locations)
- Optimizing thermal applications and system operations.

In addition, it is critical that regulatory requirements associated with interconnecting with the grid in California be met. These vary from utility to utility. Specific challenges included:

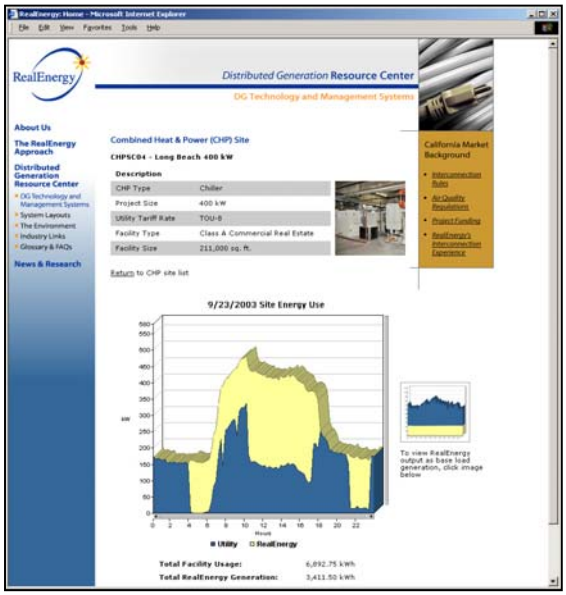
- No standardized application requirements
- Utility/inspectors need more experience and understanding of DG/CHP
- No formalized communications between utility personnel and applicants
- No standardized definition and protocol for a "complete" application
- Different requirements across utilities
- Different utilities require different types of protection devices.

Results

RE designed a Distributed Energy Information System (DEIS) built with "off the shelf" technology to meter, manage, and monitor the DG.

The technical design criteria included precision (quality and quantity of outputs), compatibility with existing building energy management systems, hardware/software integration in the platform device, durability, and remote operation. Business considerations included cost, data ownership, and versatility. Required functions were to:

- Communicate and operate the DG system on site
- Interface and manage the system with the host facility
- Communicate with corporate servers, mobile operations, and maintenance staff.



Data for selected facilities are available on the RealEnergy Web site at http://www.realenergy.com/

The DEIS needs to gather information about each DG system and report to a central control station, which provides complete management capability as well as records to support billing for services.

RE modeled the inputs and communication requirements needed to install a command-and-control module on each of its DG systems, which laid the foundation for optimized enterprise-wide dispatch.

Using off-the-shelf hardware, RE and its vendor developed the software to complement the metering hardware. This enabled RE to meter, monitor, operate, and dispatch its fleet simply, safely, cost effectively, and within the parameters of Rule 21 (California's interconnection governance).

Primary data capture is from the power meter (ION Enterprise 7500 meter series). The data is stored in a Sybase database, and Web-based analysis tools and data display are available.

RE isolated system metrics that influence optimal dispatch and management of a DG network. Codes were installed, field-tested, and improved in real-time operations. Feedback allowed RE to improve the algorithms over time to make them more useful to operations, compliance, and billing departments.

The dispatch of RE's fleet of systems can now:

- Account for site demand and economic operating parameters and regulatory compliance issues
- Help individual systems independently avoid or minimize non-optimal dispatch scenarios
- Allow for the automated choice of dispatch options at potential hybrid projects
- Be remotely monitored and operated 24/7.

Over the course of 2002, RE became the first DG company to successfully interconnect with every major utility in California. Its learning process and collaborations helped influence the DG-friendly development of California's Rule 21. Improvements to RE's internal processes helped streamline interconnections and positively influence utilities' expectations and handling of interconnection applications for the entire DG community

The RE DG Technology and Management Systems Web site is the first DG site of its kind. It dynamically details onsite operation information for public consumption. It serves as a public clearinghouse for information about interconnection, incentives, and RE's interconnection experience in California.

Publications

RealEnergy. "Development, Demonstration, and Field Testing of Enterprise-Wide Distributed Generation Energy Management System." NREL/SR-560-33581. April 2003.

Publications are available on the NREL publications database, http://www.nrel.gov/publications/.

Contacts

NREL Technical Monitor
Holly Thomas (303) 275-3755
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401

NREL DEER Technology Manager
Richard DeBlasio (303) 275-4333
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401

DOE Program Manager
Eric Lightner (202) 586-8130
U.S. Department of Energy
EE-2D/Forrestal Building,
1000 Independence Ave., SW
Washington, DC 20585

Additional Distributed Power Information
http://www.electricity.doe.gov/

National Renewable Energy Laboratory
1617 Cole Boulevard
Golden, CO 80401-3393

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